Space Weather Forecast

Issued on Saturday, 12 August 2023 at 01:15 Local

This forecast provides a four-day assessment of space weather events. The probabilities stated below are for reaching or exceeding the given levels. For more information about space weather impacts please see the Met Office Space Weather Scales https://www.metoffice.gov.uk/weather/learn-about/space-weather/uk-scales

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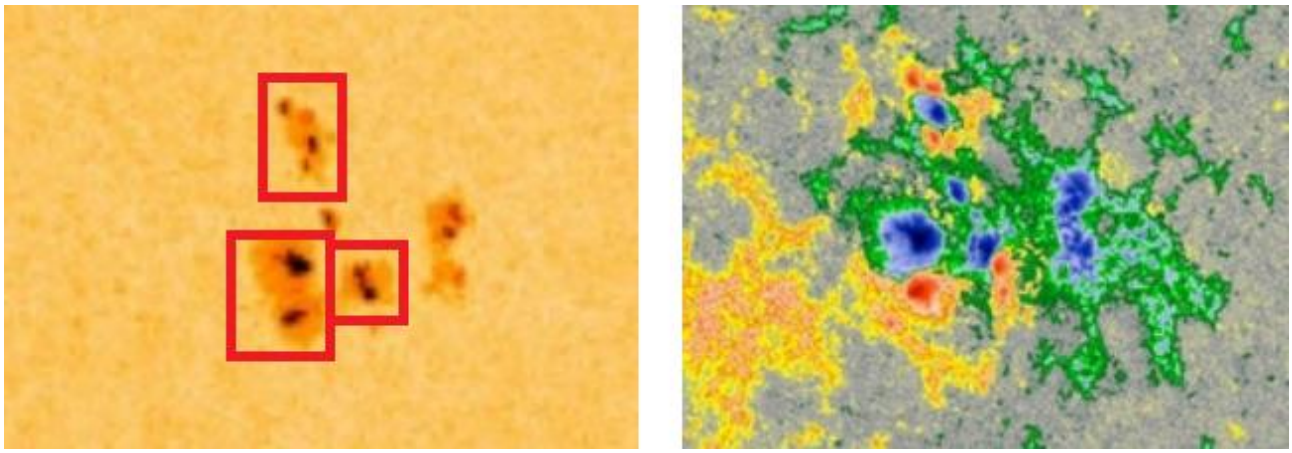
Space Weather Forecast Headline: Chance of Minor Geomagnetic Storm G1 to start new UTC working week. Chance of R1 Minor Radio Blackouts throughout.

Analysis of Space Weather Activity over past 24 hours

Solar Activity: Solar activity remained low over the past 24 hours, with occasional Common-class flares observed, peaking with an event at 11/0645UTC from over the northeastern solar horizon. Other productive regions included the most complex sunspot group in the northwest, and also a faded region near the southwestern solar horizon.

There are now up to five surviving sunspot regions on the Earth-facing side of the Sun, including two small magnetically unipolar groups. Of the remainder, the most complex in the northwest showed some growth in its intermediate spots in the north. Also of note was a sunspot region near the solar meridian, which saw prolific areal growth. Finally a third bipolar group was quieter in the southeast.

Figure 1: Visible and magnetic polarity satellite imagery of the most complex sunspot group on the Sun at 11/2300UTC. Shown boxed red are several candidates for potentially unstable configurations whereby opposing magnetic polarities occupy the same spot. Despite these, the sunspot group has yet to produce significant flare activity.



Coronal Mass Ejection (CME) candidates seen in the period were apparently confined to peripheral emission locations. These included narrowly behind the northeastern solar horizon around 11/0630UTC, with a few subsequently emitted from the southeastern solar horizon during the UTC morning and early afternoon. These have been analysed, with no Earth-bound component evident. No CMEs are thought to be en route as a result.

Solar Wind / Geomagnetic Activity: Solar winds were slightly elevated through the UTC day of Friday 11 August, most likely from a weak coronal hole high speed stream.

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Solar wind speeds showed a weak decline within slightly elevated levels, with the number of particles remained within their typical background range. The associated magnetic field was erratic but again at background throughout. The north-south component of this magnetic field was again erratic in character, with no prolonged periods anti-aligned with Earth (which would usually lead to greater geomagnetic effect).

The net result of the above solar wind measures was for provisionally quiet geomagnetic conditions throughout.

Energetic Particles / Solar Radiation: Solar radiation, specifically proton flux continued erratically easing, after the enhancement due to the 07 Aug Strong class X-ray flare from a sunspot now long-past the western solar horizon. Having peaked at 47pfu early on 09 August, flux remained below the S1 level (10pfu) through the last 24 hours, crossing 1pfu downwards in the period.

Four-Day Space Weather Forecast Summary

Solar Activity: There is a daily Chance of Moderate-class X-ray flares, with the main risk from the developing sunspot region in the northwest.

Solar Wind / Geomagnetic Activity: There are no Earth-directed CMEs. The sole fast wind enhancement, is now thought to potentially become geoeffective on day three, Monday 14 August, with a peak Chance of Minor Geomagnetic Storm G1, perhaps extending into the following day, Tuesday 15 August. Geomagnetic activity is otherwise forecast to be mainly quiet.

Energetic Particles / Solar Radiation: Solar radiation storms are not expected in the period, with proton flux expected to continue declining erratically towards background. There is a residual slight chance of further enhancements from any of the active regions currently on the facing side of the Sun, with the greatest risk from the northwestern sunspot group.

Geomagnetic Storms:

Geo-Magnetic Storm Probability (Exceedance)	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Minor or Moderate	G1 to G2	No	1	1	30	10
Strong	G3	No	1	1	1	1
Severe	G4	No	1	1	1	1
Extreme	G5	No	1	1	1	1

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Radio Blackouts - X Ray Flares:

X Ray Flares	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC)	Day 2 (00-24 UTC)	Day 3 (00-24 UTC)	Day 4 (00-24 UTC)
Probability			(%)	(%)	(%)	(%)
Active	R1-R2 M Class	No	40	40	40	40
Very Active	R3 to R5 X	No	2	2	2	2

Solar Radiation Storms - (High Energy Protons):

Radiation Storms	Level (cm^{-2} sr^{-1} s^{-1})	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC)	Day 2 (00-24 UTC)	Day 3 (00-24 UTC)	Day 4 (00-24 UTC)
Probability (Exceedance)			(%)	(%)	(%)	(%)
Active	≥ S1	No	5	5	5	5
Very Active	≥ S3 *	No	1	1	1	1
* S3 ≥ 10 MeV ≥ 1000 pfu and / or ≥ 50 MeV ≥ 10 pfu. (pfu = $cm^{-2}sr^{-1}s^{-1}$)						

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